gas delivery system to deposit, onto said substrate, monolayers from a first reactive gas comprising fluorine and a second reactive gas, with each of said first and second reactive gases being introduced into said processing chamber with a carrier gas, and a second set of instructions to control said gas delivery system to control a quantity of fluorine associated with the monolayers by introducing, into said processing chamber, hydrogen (H_2) as a carrier gas along with said first and second reactive gases.

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REMARKS

This is intended as a full and complete response to the Office Action dated July 18, 2002, having a shortened statutory period for response set to expire on October 18, 2002. Claims 1-20 are pending in the application and stand rejected. New claims 21-25 have been added herein. Please reconsider the claims pending in the application for reasons discussed below.

The information disclosure statements filed on October 23, 2000, July 25, 2001, April 4, 2002, April 11, 2002 and June 5, 2002 fail to comply with 37 CFR § 1.98(a)(2). Applicants are submitting another information disclosure statement with copies of the references previously cited. Applicants were not able to obtain several of the references, and thus, those references are not included on the submitted information disclosure statement.

Claims 3 and 16-20 stand rejected under 35 U.S.C. § 112, second paragraph. Applicants have amended claim 3 to correct the lack of antecedent basis for "said refractory metal." Applicants have amended claim 16 to remove the reference to "first and second reactive gases." Applicants have amended claims 4, 10, 13, 15, and 16 as to matters of form. Applicants submit that the changes made herein do not introduce new matter and are fully supported by the specification. Applicants respectfully request withdrawal of the rejection of claims 3 and 16-20.

Claims 1-15 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Publication No. 2001/00441250 to *Werkhoven, et al.* Applicants submit that *Werkhoven, et al.* does not teach, show, or suggest controlling a quantity of fluorine

atoms associated with a monolayer of a second compound as a function of said carrier gas, as described in claims 1 and 10, or means for controlling a quantity of said fluorine atoms associated with the monolayer of said second compound as a function of said carrier gas, as described in claim 15. While *Werkhoven, et al.* describes using carrier gases in deposition processes, *Werkhoven, et al.* does not describe using a carrier gas to remove fluorine atoms associated with a monolayer of a second compound, as described in the present application. *Werkhoven, et al.* describes, in a second embodiment, using the reducing gas triethyl boron to remove halide tails beween metal and nitrogen phases of a process (p. 10, ¶ 105 and 106). *Werkhoven, et al.* does not specify the carrier gas used in its second embodiment. *Werkhoven, et al.* only describes specific carrier gases with respect to a first embodiment in which a deposition process is performed with a silicon-containing gas, an oxidant source gas, and a nitrogen source gas. Furthermore, *Werkhoven, et al.* does not make any distinction between the various carrier gases described with respect to the first embodiment. However, the present application shows that depositing a layer by chemisorbing alternating monolayers of a first compound and a second compound having fluorine associated therewith and using hydrogen as a carrier gas resulted in the creation of layers with substantially reduced fluorine content compared to layers deposited using argon or nitrogen as the carrier gas (p. 3, Figures 14 and 15). Applicants respectfully request withdrawal of the rejection and allowance of claims 1-15.

Claims 16-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Werkhoven, et al.* in view of Japanese Patent No. 03056678 to *Tazaki.* As discussed above, *Werkhoven, et al.* does not describe controlling the quantity of fluorine atoms associated with a monolayer by introducing a carrier gas with reactive gases into a processing chamber. Furthermore, as the Examiner notes, *Werkhoven, et al.* fails to teach the use of a controller in electrical communication with a gas delivery system, a temperature control system, and a pressure control system; and a memory in data communication with said controller, said memory comprising a computer-readable medium having a computer-readable program embodied therein, said computer-readable program including a first set of instructions for controlling said gas delivery system to chemisorb, onto said substrate, alternating monolayers of a first compound

and a second compound, with said second compound having fluorine atoms associated therewith, with each of said first and second compounds being introduced into said processing chamber along with a carrier gas, and a second set of instructions to control said gas delivery system to control a quantity of said fluorine atoms associated with the monolayer of said second compound by introducing, into said processing chamber, a carrier gas along with said first and second compounds. The Examiner states that it would have been obvious to provide a memory in communication with a controller with a computer readable program therein in order to execute a program for performing a deposition effectively, as taught by *Tazaki*. Applicants submit *Tazaki*, as understood from the translated abstract, only broadly describes controlling a vapor growth device via a CPU. Applicants submit that the combination of *Tazaki* and *Werkhoven, et al.* does not teach, show, or suggest a second set of instructions to control said gas delivery system to control a quantity of said fluorine atoms associated with the monolayer of said second compound by introducing, into said processing chamber, a carrier gas along with said first and second compounds, as recited in amended claim 16. Applicants respectfully request withdrawal of the rejection and allowance of claims 16-20.

Applicants further submit that *Werkhoven, et al.* and *Tazaki*, alone or in combination, do not teach, show, or suggest a processing system as recited in claim 16, wherein the purge gas and the carrier gas have differing constituents, as recited in claim 20. With respect to the purge gas, *Werkhoven, et al.* only describes allowing the carrier gas to continue flowing after the flow of reactive gases is stopped (p. 10, ¶ 121). Thus, *Werkhoven, et al.* only describes using a purge gas that is the same as the carrier gas. Applicants respectfully request withdrawal of the rejection and allowance of claim 20.

Applicants have added new claim 21. Applicants submit that the changes made herein do not introduce new matter and are fully supported by the specification. As discussed above with respect to claim 20, Applicants submit that *Werkhoven, et al.* and *Tazaki*, alone or in combination, do not teach, show, or suggest a method for forming a layer on a substrate, wherein the purge gas and the carrier gas have differing constituents. Applicants respectfully request allowance of claim 21.

Applicants have added new independent claims 22-25. Applicants submit that the changes made herein do not introduce new matter and are fully supported by the specification. Applicants submit that *Werkhoven, et al.* and *Tazaki*, alone or in combination, do not teach, show, or suggest controlling a quantity of fluorine associated with a layer by using hydrogen as a carrier gas, as recited in claims 22-25. As discussed above, *Werkhoven, et al.* and *Tazaki*, alone or in combination, do not describe using a carrier gas to control a quantity of fluorine associated with a layer. Furthermore, *Werkhoven, et al.* and *Tazaki*, alone or in combination, do not teach, show, or suggest using hydrogen rather than other carrier gases either to control a quantity of fluorine associated with a layer or to obtain another result. Applicants respectfully request allowance of claims 22-25.

In conclusion, the references cited by the Examiner, neither alone nor in combination, teach, show, or suggest the method or process of the present invention. Having addressed all issues set out in the office action, applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

The prior art made of record is noted. However, it is believed that the secondary references are no more pertinent to the Applicants' disclosure than the primary references cited in the office action. Therefore, it is believed that a detailed discussion of the secondary references is not deemed necessary for a full and complete response to this office action. Accordingly, allowance of the claims is respectfully requested.

Respectfully submitted,

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APPENDIX

4. (Amended) The method of claim 1 wherein said second compound includes a refractory metal [is] selected from the group consisting of titanium (Ti) and tungsten (W).

10. (Amended) A method for forming a layer on a substrate disposed in a processing chamber, said method comprising:

serially exposing said substrate to first and second reactive gases, with said first reactive gas having a first compound associated therewith and said second reactive gas having a second compound associated therewith, to form alternating monolayers of said first compound and said second compound, with said second compound having fluorine atoms associated therewith;

controlling a quantity of said fluorine atoms associated with the monolayer of said second compound by introducing into said processing chamber a carrier gas along with said first and second reactive gases; and

purging said processing chamber following chemisorption of each of the alternating monolayers.

13. (Amended) The method as recited in claim 12 wherein said first compound includes [a] diborane (B_2H_6) and said second compound is tungsten (W).

15. (Amended) A processing system for processing a substrate in a processing chamber, said system comprising:

means for chemisorbing, onto said substrate, alternating monolayers of a first compound and a second compound, with said second compound having fluorine atoms associated therewith, with each of said first and second compounds being introduced into said processing chamber along with a carrier gas; and

means for controlling a quantity of said fluorine atoms associated with the [monolayer] monolayers of said second compound as a function of said carrier gas.

16. (Amended) A processing system for a substrate, said system comprising:

a body defining a processing chamber;

a holder disposed within said processing chamber to support said substrate;

a gas delivery system in fluid communication with said processing chamber;

a first temperature control system in thermal communication with said processing chamber;

a pressure control system in fluid communication with said processing chamber;

a controller in electrical communication with said gas delivery system, said temperature control system, and said pressure control system; and

a memory in data communication with said controller, said memory comprising a computer-readable medium having a computer-readable program embodied therein, said computer-readable program including a first set of instructions for controlling said gas delivery system to chemisorb, onto said substrate, alternating monolayers of a first compound and a second compound, with said second compound having fluorine atoms associated therewith, with each of said first and second compounds being introduced into said processing chamber along with a carrier gas[;], and a second set of instructions to control said gas delivery system to control a quantity of said fluorine atoms associated with the monolayer of said second compound [controlling a quantity of said fluorine atoms associated with the monolayer of said second compound] by introducing, into said processing chamber, a carrier gas along with said first and second [reactive gases] compounds.